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A 2 x 2 x 4 factorial design was utilized to investigate the effects of sex of perceiver, race of expressor (Negro and White), and mode of presentation of stimuli (audio and visual, visual only, audio only, and still pictures) on perception of emotion (POE). Perception of seven emotions (anger, happiness, surprise, fear, disgust, pain, and sadness) was analyzed in terms of three dependent variables: total accuracy scores, correct perception of individual emotion scores, and erroneous perception of individual emotion scores. Results indicate a main effect for sensory modality: emotions are most accurately perceived in audio and visual presentations, followed by visual only, audio only, and still picture presentations. Females were found to be superior to males in overall POE. Contradictory results were obtained on race of expressor: (a) Negroes were more accurately perceived in the expression of anger and sadness; (b) Whites were more accurately perceived in the expression of happiness and fear. (Author)

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CONTENTS

ILLUSTRATIONS

TABLES

FIGURES

ABSTRACT

A 2x2x4 factorial design was utilized to investigate the effects of sex of perceiver, race of expressor (Negro and white), and mode of presentation of stimuli (audio/visual, visual/only, audio/only and still pictures) on perception of emotion (POE). Perception of seven emotions (anger, happiness, surprise, fear, disgust, pain and sadness) was analyzed in terms of three dependent variables: total accuracy scores, correct perception of individual emotion scores, and, erroneous perception of individual emotion scores.

Results indicate a main effect for sensory modality: emotions are most accurately perceived in audio/visual, followed by visual/only, audio/only and still pictures respectively. There was also main effect for sex of perceiver: females were superior to males in overall POE. Contradictory results for main effect of race of expressor were obtained; Negroes were more accurately perceived in the expression of anger and sadness, whereas whites were more accurately perceived in the expression of happiness and fear.

PROBLEM

In 1872 Charles Darwin (1872) published his now classic investigation of perception of emotion (POE) in man. The results of his research demonstrated that nonverbal communication such as vocal inflection and intonation, hand gestures, bodily movement and facial expressions are at least as important as the verbal content in perception and recognition of emotional states. The 1920's saw a resurgence of investigation into nonverbal communication as related to perception of emotional expression. Although POE research has continued to the present, it has been, at best, sporadic and limited in its scope, and attention to many operative variables has been ambiguous or completely lacking. Previous research has also been limited by its almost exclusive utilization of still pictures as stimuli and by ignoring the possible influence of the race of the expressor as a variable.

This study endeavored to test simultaneously a number of variables. It will test the effects of sex of perceiver, race of expressor and mode of presentation of stimuli in POE. It will test not only the effect of these variables in terms of accuracy of perception, but also test the patterning of erroneously perceived emotions.[1]

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[1]An erroneously perceived emotion is one, which was in fact percived when the perceiver did not correctly judge the emotion expressed.

Perception of Emotion: Differences in Modes of Presentation

The earliest systematic effort to investigate POE as a function of nonverbal communication was the previously mentioned work of Darwin (1872). He pioneered the use of still photographs of facial expressions as stimuli in the judgments of emotions. Reviews of literature (Jenness, 1932; Bruner and Taguiri, 1954; Ekman, 1965) indicate that still photographs have, since that time, been the most often used stimuli in the studies dealing with recognition of emotion through nonverbal cues (Rudolph, 1903; Feleky, 1914; Ruckmick, 1922; Landis, 1929; Jenness, 1932; Kline and Johannsen, 1935; Munn, 1940).

The shortcomings of still photographs, both candid and posed, as stimuli in POE studies have been pointed out for more than thirty years. Jenness (1932) commented that:

> "...no single photograph of swiftly moving facial musculature is an adequate portrait of an expression of emotion, the changes in tonus being probably more important than the position of the features at any particular instant. Motion pictures might therefore be more readily recognized than single photographs."

Some researchers heeded this suggestion and began investigating POE by means of motion pictures (Sherman, 1927a; Dusenbury and Knower, 1937; Coleman, 1949), voice samples, both live and recorded (Sherman, 1927b; Dusenbury and Knower, 1939) and live expressors (Meltzer and Thompson, 1964; Drag and Shaw, 1967).

Although some of the studies previously mentioned are

limited in the rigor of experimental design and the absence of tests of significance, thus making a systematic comparison of the findings difficult, two overall trends seem to be apparent. First, an above-chance accuracy of perception can be expected even when still photographs, both posed and candid, are used as stimuli. Second, the use of other modes of presentation, for example, motion pictures, improves accuracy of judgment of POE.

Perception of Emotion: Sex Differences

Both Jenness (1932) and Bruner and Taguiri (1954) in their reviews of POE literature conclude that experimental evidence leads to conflicting and often contradictory results regarding sex differences.

Some studies have found no differences at all in POE (Sherman, 1927a; F.H. Allport, 1924; Jarden and Fernberger, 1926; Fernberger, 1927; Guilford, 1929; Boring and Titchener, 1932; Gates, 1932; Coleman, 1949).

At the same time, a number of studies report that women excel men in both the expression and perception of emotion (Buzby, 1924; Jenness, 1932; Dusenbury and Knower, 1938, 1939; Kellogg and Eagleson, 1932; Vinacke, 1949; Vinacke and Fong, 1955; Meltzer and Thompson, 1964; Drag and Shaw, 1967). However, Kanner (1932) reports that men are slightly more accurate than women in POE.

In summary, and taking into account the limitations in variety of modes of presentation in various studies, the weight of evidence seems to favor a slight superiority of women in both the perception and the expression of emotions.

Perception of Emotion: Racial Differences

Several studies have investigated the effect of the race of the perceiver on POE, and have endeavored to identify personality correlates involved in stereotyping of black expressors (Kellogg and Eagleson, 1932; Secord, Bevan, and Katz, 1956; Secord, 1959). Meanwhile, other studies have attempted to investigate differences which may exist within various national and racial groups (Dickey and Knower, 1947; Carter, 1948; Vinacke, 1949; Vinacke and Fong, 1955).

Although all of the studies mentioned thus far have in some way focused on differences between national or racial groups and their patterns of perceiving emotions, none have dealt specifically with the question of whether black and white Americans are perceived differently when expressing their emotions.

Perception of Emotion Model

Woodworth (1938) showed that emotional expressions could be arranged on a scale with six ordered categories: (1) mirth; (2) surprise; (3) fear, suffering; (4) anger, determination; (5) disgust; and (6) contempt. Use of this scale yielded a correlation of .92 between intended pose and judgment of the observers.

Basing his studies on Woodworth's results, Schlosberg

(1952) speculated that this scale was circular in nature. From this speculation he factor analytically developed the two dimensions of Unpleasant-Pleasant and Attention-Rejection. However, dissatisfied with a two-dimensional model, Schlosberg (1954) later added a third dimension, Sleep-Tension.

Abelson and Sermat (1962) criticized the addition of a third dimension stating that, "...the Schlosberg scales /dimensions/ do suffer however from redundancy in that two scales /dimensions/ seem to serve as well as three." Engen's (1965) suggestion is that the two-dimensional model is more triangular or diamond-like than round and, instead of a Sleep-Tension third-dimension, a smaller and more dynamic dimension is probably required.

Meltzer and Thompson (1964) and Drag and Shaw (1967) have criticized the Woodworth-Schlossberg scale claiming that it is a 5-step rather than a 6-step scale, with disgust and contempt appearing in the same rather than exclusive categories. Both studies have also failed to discover any evidence of circularity since contempt is rarely confused with its purportedly adjacent category of love or happiness.

In summary, many POE studies previously described have been hampered by seemingly contradictory results, lack of experimental rigor, failure to utilize tests of significance to make the data meaningful, and the absence of specific investigation into certain operative variables. This study will attempt to

add clarity to the previously investigated variables of sex of the perceiver and mode of presentation of stimuli and, at the same time, test the effect of the race of expressor in POE.

Based on evidence from previous studies, it was predicted that females will perceive emotional expressions with significantly greater accuracy than males (Jenness, 1932; Dusenbury and Knower, 1937, 1939; Vinacke, 1949; Vinacke and Fong, 1955). No directional hypotheses were postulated relating to the effects of mode of presentation of stimuli or race of expressor due to the paucity of empirical data concerning the two variables.

METHOD

The three independent variables were: modality (audio/visual, visual/only, audio/only and still/pictures); race of expressor (white and Negro); and sex of perceiver. A 2x2x4 factorial design was employed.

FIGURE 1

Research Design

S of P[1]	Male								Female							
R of E[2]	White				Negro				White				Negro			
Modality	A/V	V/O	A/O	S/P[3]	A/V	V/O	A/O	S/P	A/V	V/O	A/O	S/P	A/V	V/O	A/O	S/P
Group #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

1. S of P indicates sex of perceiver
2. R of E indicates race of expressor
3. A/V indicates Audio/Visual; V/O indicates Visual/Only; A/O indicates Audio/only; and S/P indicates Still/Pictures.

Subjects

Subjects (N=183) for this experiment were non-volunteer white male and female undergraduates from Boston University and Northeastern University. The ratio between males and females was approximately 1 : 1. The male and female subjects were randomly assigned to various treatment groups.

Expressors

The expressors were ten female professional actresses (five white

and five Negro) from the Harvard Summer Players and the People's Theatre of Cambridge. Each actress was photographed with a 16 mm. Auricon sound motion picture camera (black and white film) while enacting various emotions. Each actress was filmed individually, enacting seven emotions in sequence; anger, happiness, surprise, fear, disgust, pain and sadness. In selecting the emotions to be portrayed, emphasis was placed on maximizing the ease with which the emotion could be enacted.

In order to keep all extraneous variables constant, the actresses were filmed while seated, facing 45^{o} away from the camera, as if they were interacting with another person out of view of the camera. Each actress was filmed at 3/4 full figure. The background and lighting were kept constant in all cases. Furthermore, no actress was allowed to change her make-up or her dress, or in any other way alter her appearance between portrayals of emotion. Retakes were shot whenever the director or the actresses were dissatisfied for any reason with the original take.

As each actress portrayed a particular emotion, she recited the same monologue: "Where are you? What are you doing?", thus maintaining the semantic content constant across all emotion portrayals and all of the modes of presentation. The 35 emotion portrayals of the white actresses (seven emotions for each of the five actresses) were spliced in random order into one large reel. The same procedure was used with the 35 portrayals of emotion of the Negro actresses. Each emotional portrayal lasted approximately ten seconds.

Modality

Mode of presentation was manipulated by exposing Groups 1, 5, 9 and 13 to sound motion picture enactments of the seven emotions. Groups 2, 6, 10 and 14 were exposed to the visual/only presentations and Groups 3, 7, 11 and 15 were exposed to the audio/only presentations. Groups 4, 8, 12 and 16 were shown still pictures projected on a screen. The still pictures consisted of 70 enlargements (ten actresses x seven emotions) of single frames from the motion picture that were independently judged by three graduate students as the most typical of the emotions. Groups 1 through 4 and 9 through 12 were exposed to the white female portrayals, while Groups 5 through 8 and 13 through 16 were shown the Negro female portrayals.

Procedure

Subjects were tested in group sessions. The subjects belonging to each experimental group were brought into a classroom, seated and handed a folder containing a sheet of instructions, an answer sheet, and a list of the seven emotions to be enacted printed on the left hand inside sheet of the folder (see Appendices A-B). The listing of the emotions were randomly ordered to eliminate the possibility of bias that might result from an alphabetical or any other systematic listing of the names. After each portrayal of emotion, the subjects were allowed 20 seconds to judge the emotion which they thought corresponded best with the portrayal from the list given to them. Half way through the judgment indicated, the subjects were informed of the remaining time allotted them.

RESULTS

Subjects' responses were coded:

1. as to whether they were correct or incorrect, that is whether the emotion perceived corresponded to the emotion portrayed, and
2. where incorrect, what emotion was, in fact, perceived.

Thus the analysis involved three types of dependent variables scores: (1) total accuracy scores; (2) correctly perceived scores for each emotion, and (3) erroneously perceived scores for each emotion. The sequence of results to be presented corresponded to the three types of scores used in the analysis; first, overall accuracy in POE, second, patterning of correctly perceived individual emotions, and third, patterning of erroneously perceived individual emotions.

Results were interpreted according to Winer's discussion of interpretation of analysis of variance. The Newman-Keuls test was used throughout the analysis to test significant differences between individual multiple means.

Total Accuracy Scores

Women were significantly better than men in overall accuracy of perception of emotional expression (main effect for S of P[1] -- $F=13.918$, $df=1/167$, $p<.001$). Accuracy of perceiving emotion was dependent upon the mode of presentation of the stimuli.

[1] S of P indicates sex of perceiver; R of E indicates race of expressor.

Results of analysis indicates significantly greater accuracy in the audio/visual presentation when compared to the visual/only, the audio/only and still picture modalities (main effect for modality -- F=61.088, df=3/167, p<.001). Significantly higher scores were also recorded in the visual/only mode than in the audio/only and still picture modes. Analysis of total correct scores also resulted in significant higher order interaction between sex, race and modality (F=3.350, df=3/167, p<.05). There was no significant main effect for race of expressor (F=2.117, df=1/167, p>.05).

Correctly Perceived Emotions

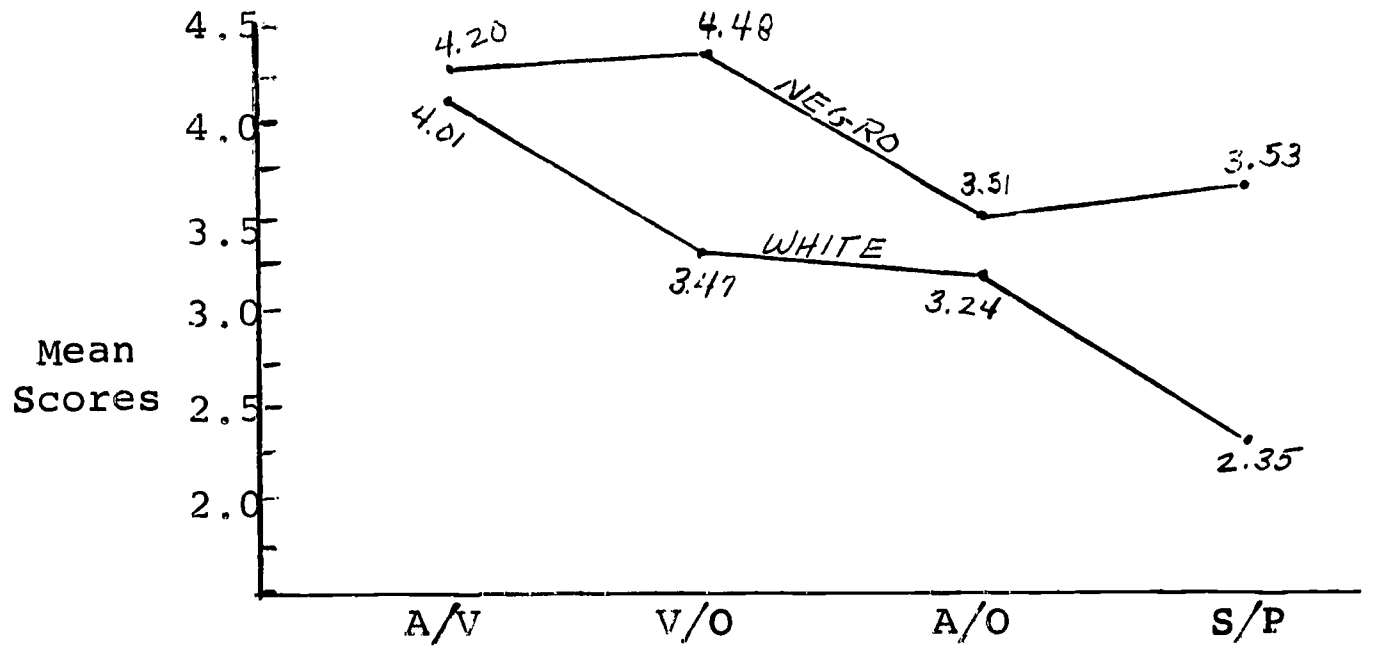
Anger. Expressing anger, the Negro actresses were perceived with significantly higher accuracy than their white counterparts (main effect for R of P -- F=23.349, df=1/167, p<.001). In addition, the audio/visual and the visual/only modalities produced significantly higher accuracy than the still photographs (main effect for modality -- F=15.439, df=3/167, p<.001). Anger in Negroes was perceived more accurately than in the whites in the Visual/only and the still modalities. This significant interaction (F=3.370, df=3/167, p<.05) between the race and modality is shown in Figure 2.

Happiness. Females perceived happiness correctly at a significantly higher level than males (main effect for S of P -- F=4.305, df=1/167, p<.05). White expressors were correctly perceived enacting happiness at a significantly higher level than Negro

expressors (main effect for R of E -- F=11.246, df=1/167, p<.001). The audio/visual, visual/only and still modalities produced a significantly higher level of correct responses than the audio/only for the presentation of this emotion (main effect for modality -- F=37.377, df=3/167, p<.001).

FIGURE 2

Race x Modality for Correct POE -- Anger



Interaction between sex and race produced a significant difference in male and female perception of both Negro and white expressors (F=4.639, df=3/167, p<.05). Although both sexes perceived Negroes with less accuracy, males perceiving Negro expressors were significantly less accurate than males perceiving whites. Males perceiving Negro expressors were also significantly less accurate than females perceiving both races. (see Figure 3) Analysis of perception of happiness data from both white and black expressors indicated a significant interaction between race of

expressor and modality. Accuracy was lower in audio/only as compared to the three other modes of presentation (F=4.418, df=3/167, P<.01) (see Figure 4).

FIGURE 3

Sex x Race for Correct POE -- Happiness

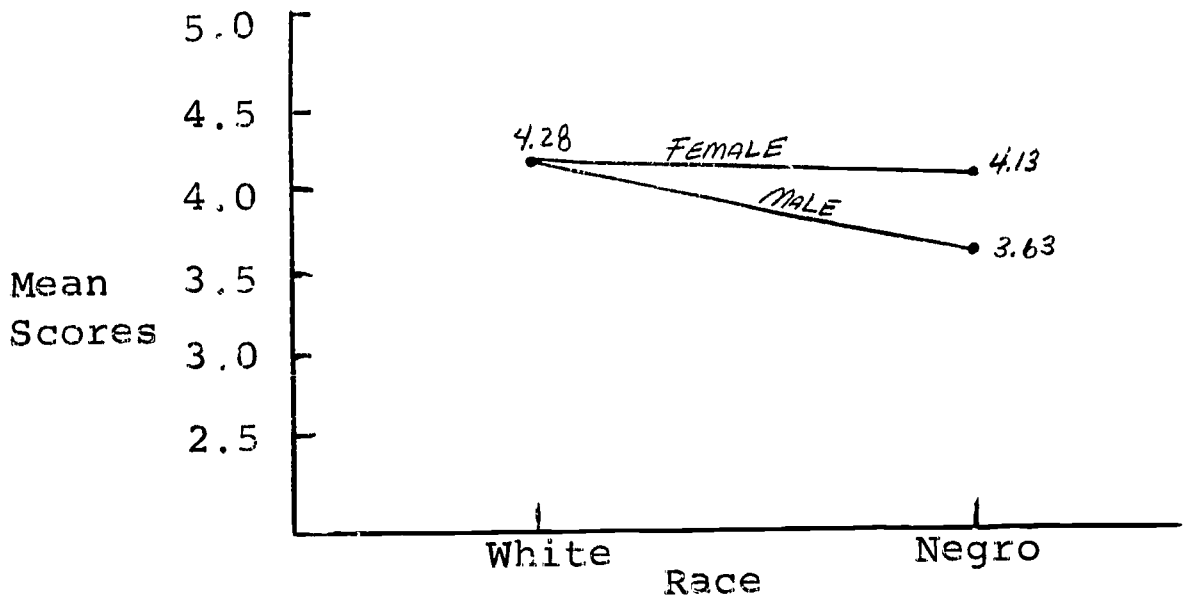
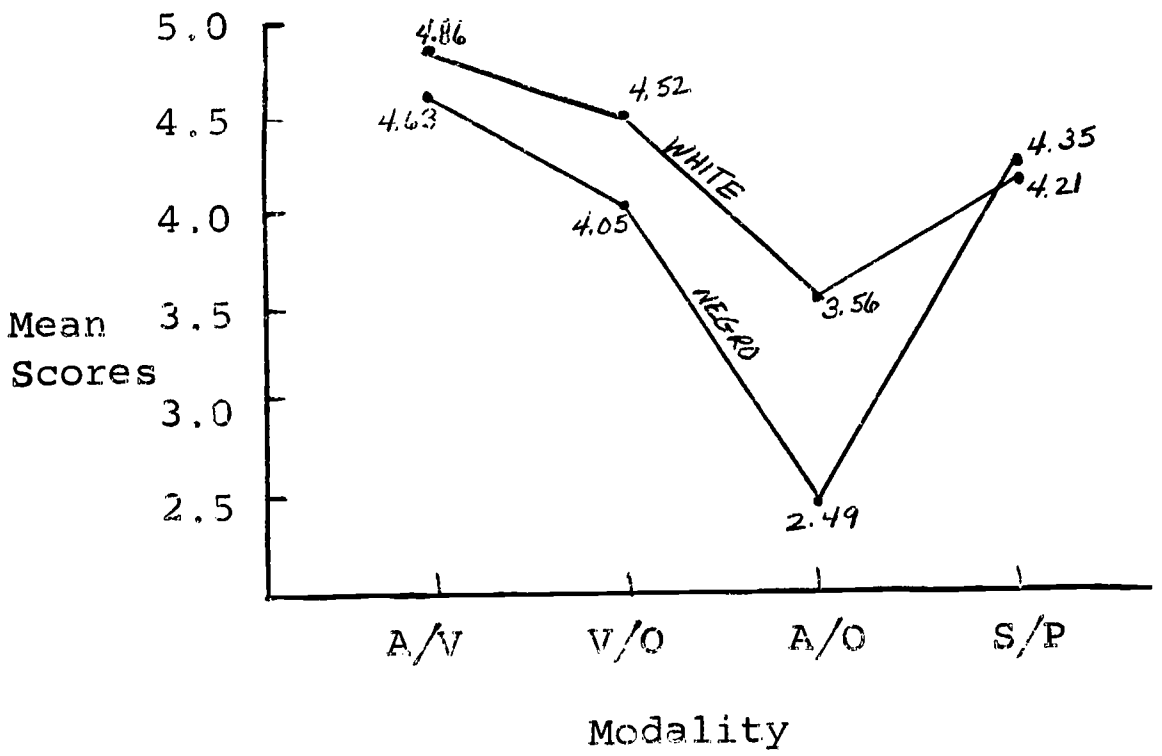


FIGURE 4

Race x Modality for Correct POE -- Happiness

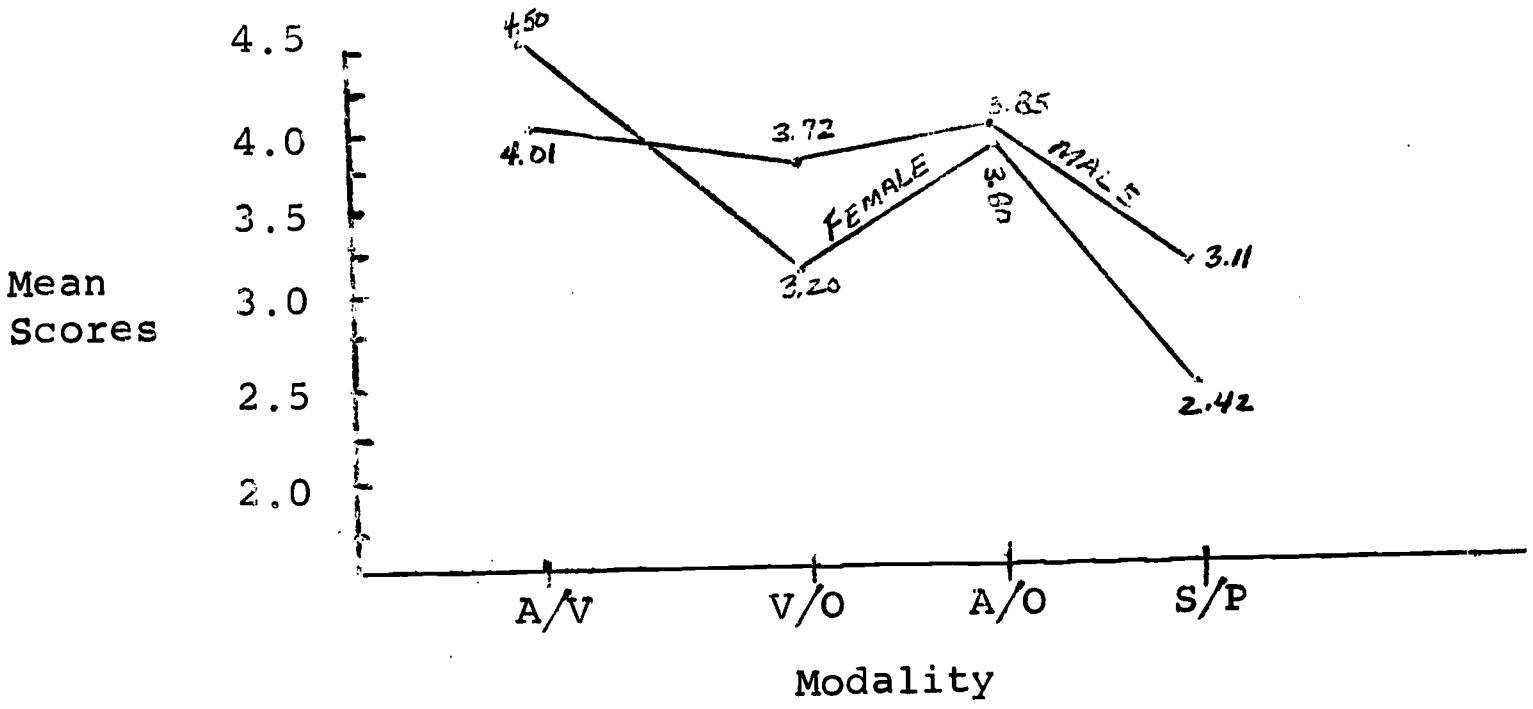


Surprise. When the emotion of surprise was expressed, there was significantly greater accuracy of perception for the audio/visual, visual/only and audio/only modalities than for still photographs (main effect for modality--F=25.782, df=3/167, p<.001).

Significant interaction between sex and modality (F=4.466, df=3/167, p<.01) indicated that females perceived more accurately in audio/visual, and that males scored higher on visual/only, audio/only and stills. (see Figure 5).

FIGURE 5

Sex x Modality for Correct POE -- Surprise



Fear. The accurate perception of fear by females was significantly higher than that by males (main effect for S of P -- F= 5.250, df=1/167, p<.05). In addition, white actresses were perceived with significantly higher accuracy than black actresses in their portrayals of fear (main effect for R of E -- F=5.437, df=1/167, p<.05).

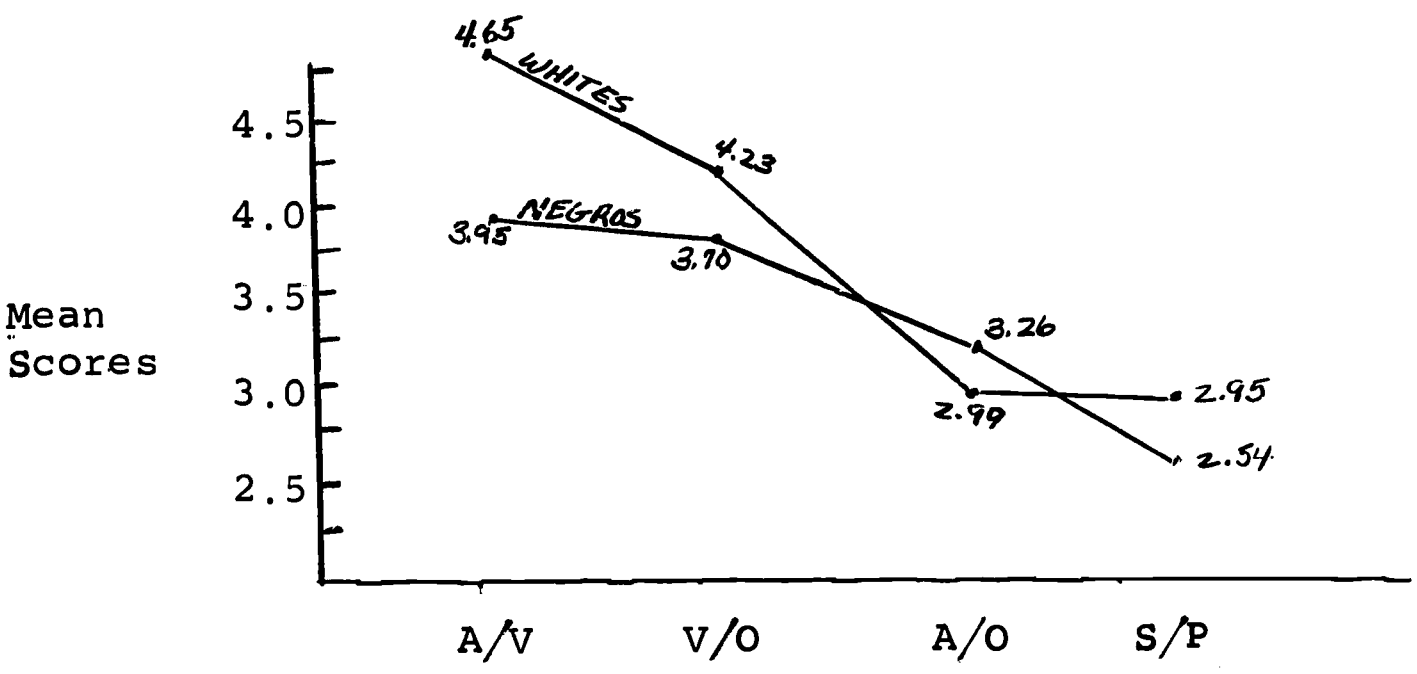
Main effect for modality indicated that perception was

significantly more accurate in audio/visual as compared to still and audio/only, and that visual/only was significantly better than still (F=26.699, df=3/167, p<.001). Significant interaction between race and modality (F=2.602, df=3/167, p<.05) demonstrated that white actresses presented audio-visually were perceived with significantly more accuracy than both Negro and whites presented in audio/only or still modalities.

White actresses presented in visual/only were perceived correctly more often than whites presented in audio/only and Negroes and whites presented on stills. Negro actresses were perceived more accurately in audio/visual and audio/only when compared to Negro actresses presented on stills. This interaction is presented in Figure 6.

FIGURE 6

Race x Modality for Correct POE -- Fear



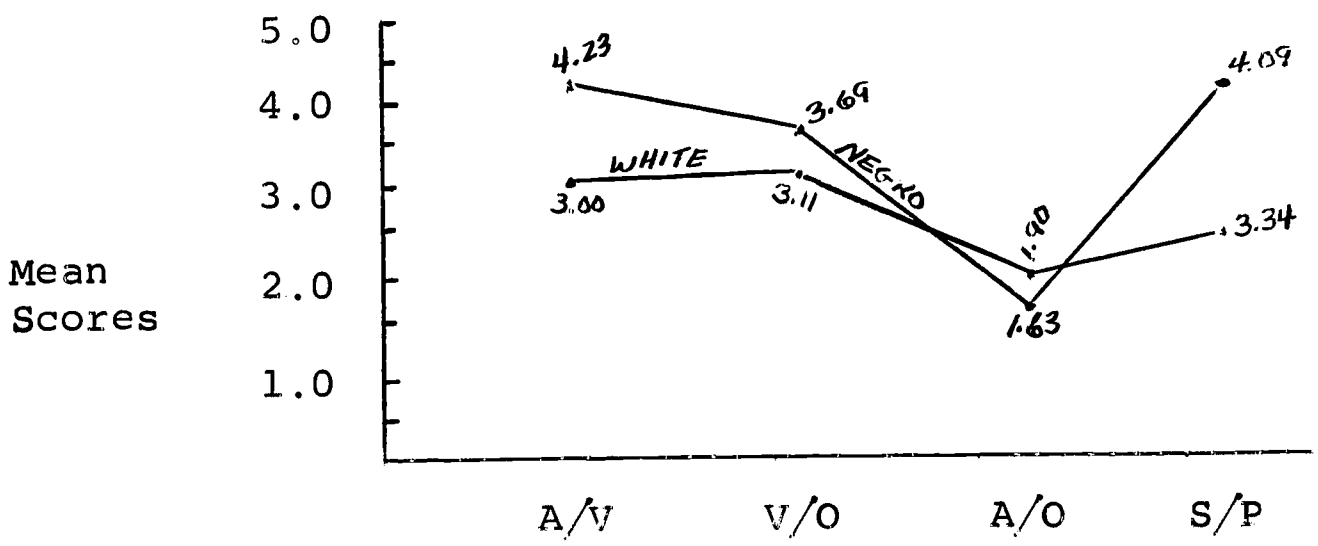
Disgust. Females perceived the emotion of disgust with significantly more accuracy than males ($F=11.771$, $df=1/167$, $p<.001$). There was also significant main effect for modality ($F=17.818$, $df=3/167$, $p<.001$), which revealed that disgust is perceived significantly better on the audio/only modality as compared to still pictures.

Pain. Negro actresses were perceived more accurately enacting pain (main effect for R of E -- $F = 12.847$, $df=1/167$, $p<.001$). Use of the audio/only modality resulted in significantly lower scores than the other three modes of presentation (main effect for modality -- $F=32.929$, $df=3/167$, $p<.001$).

Significant interaction between race of expressor and modality ($F=3.836$, $df=3/167$, $p<.01$) reflected the more accurate perception of Negro and white actresses in the audio/visual, visual/only and still as compared to the audio/only modalities (see Figure 7).

FIGURE 7

Race x Modality for Correct POE -- Pain



There was also significant interaction between sex, race and modality ($F=3.046$, $df=3/167$, $p<.05$).

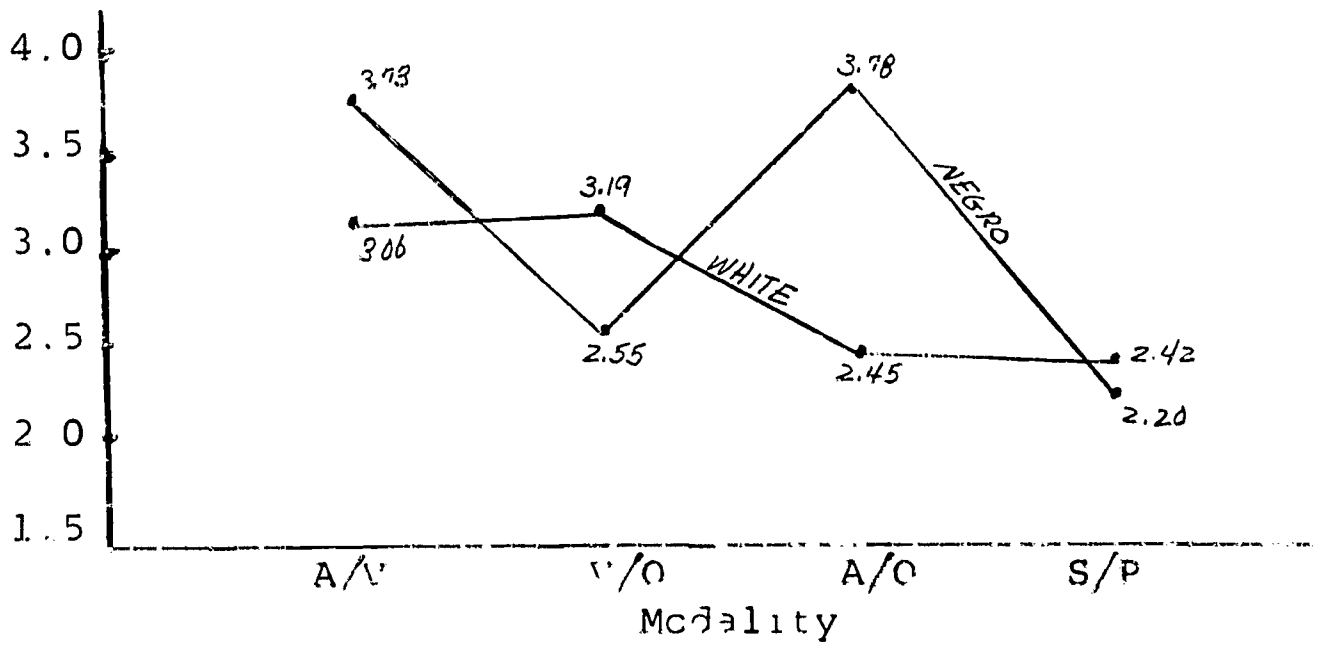
Sadness Significant main effect for sex of perceiver reflected greater accuracy on the part of females in the perception of sadness (F=4.370, df=1/167 p<.05). Analysis also showed that the audio/visual modality produced greater accuracy of perception than still pictures (main effect for modality -- F=8.945 df=3/167 p<.001).

Interaction between race of expressor and modality (F=8.176 df=3/167 p<.001) indicated the more accurate perception of Negroes in audio/visual and audio/only modalities as compared to the perception of Negroes and whites in stills and whites in audio/only mode (see Figure 8).

The effect of mode of presentation of stimuli was highly significant, not only in terms of total accuracy scores but also for each of the seven individual emotions. With some exceptions audio/visual was superior to visual/only which was superior to audio/only which, in turn was superior to still pictures. Sex of perceiver was somewhat less potent as an independent variable. It generated significant results in the

FIGURE 8

Race x Modality for Correct POE -- Sadness



analysis of total accuracy scores and in four out of sever emotions Where significant women emerged as superior to men in their ability to perceive emotion. Race of expressor led to even fewer significant differences; main effect for four of the sever individual emotions and no main effect for total accuracy scores No consistent pattern emerged in these last findings White expressors were perceived with higher accuracy enacting happiness and fear, while Negro expressors led to higher scores when enacting anger and sadness. However race of expressor interacting with mode of presentation was found significant in five out of seven individual emotions

Differences among sex race and modality for total correct scores and scores for the individual emotions are summarized in Table 1.

TABLE 1

Level of Significant Differences in Accuracy of POE

Emotion	A*	B	C	AB	AC	BC	ABC
Total	001		001				05
Anger		001	001			05	
Happiness	.05	001	001	.05		01	
Surprise			.001		01		
Fear	.05	05	.001			05	
Disgust	001		.001				
Pain		.001	001			01	05
Sadness	.05		001			001	

* A - Sex of perceiver
B - Race of expressor
C - Mode of presentation

Erroneously Perceived Emotion

In addition to the accuracy score data, erroneous perception scores for the seven individual emotional expressions were analyzed. As indicated before, an erroneously perceived emotion is defined as that emotion which was in fact perceived when the perceiver did not correctly judge the emotion expressed. This section will present the results of these analyses.

Anger. Males erroneously perceived the other six emotions as anger at a significantly higher level than females (main effect for S of P -- $F=9.685$, $df=1/167$, $p<.01$). At the same time, the black actresses were erroneously perceived as enacting anger at a significantly higher level than their white counterparts (main effect for R of E -- $F=3.715$, $df=1/167$, $p<.05$). Analysis also revealed that anger was erroneously perceived significantly more in visual/only, audio/only and in still pictures than in the audio/visual presentation (main effect for modality -- $F=10.686$, $df=3/167$, $p<.001$).

Happiness. Males erroneously perceived happiness more than females (main effect for S of P -- $F=5.543$, $df=1/167$, $p<.05$) There was a significant modality difference with erroneous perception occuring more often in still pictures than in

audio/visual (main effect for modality -- F= 10.056, df=3/167, p<.001).

Interaction between race and modality (F=4.262, df=3/167, p<.05) indicated greater erroneous perception of both Negro and white expressors portraying happiness in still pictures than Negro and white portrayals in audio/visual and white portrayals in the visual/only mode (see Figure 9).

Surprise. Males erroneously perceived surprise significantly more than females (main effect for S of P -- F=7.811, df=1/167, p<.01). Erroneous perception was significantly higher in the audio/only and still modes of perception when compared to the audio/visual one (main effect for modality -- F=17.846, df= 3/167, p<.001).

Fear. Males erroneously perceived fear significantly more than females (main effect for R of E -- F=4.329, df=1/167, p<.05). The mode of presentation in which fear was most often erroneously perceived was audio/only. This modality was significantly higher than the other three modes of presentation (main effect for modality -- F=18.844, df=3/167, p<.001).

Negro expressors were erroneously perceived enacting fear significantly more on the audio/only modality than both Negro and white actresses on visual/only and still and Negro

expressors on audio/visual (F=6.878, df=3/167, p<.001). This interaction is shown in Figure 10. There was also a significant higher order interaction between sex of perceiver, race of expressor and modality (F=3.924, df=3/167, p<.01).

Disgust. Mode of presentation leads to significant differences in erroneous perception of disgust (main effect for modality -- F=4.897, df=3/167, p<.01).

Pain . There was also a significant difference among the four modes of presentation in erroneous perception of pain (main effect for modality -- F=6.415, df=3/167, p<.001).

FIGURE 9

Race x Modality for Erroneous POE -- Happiness

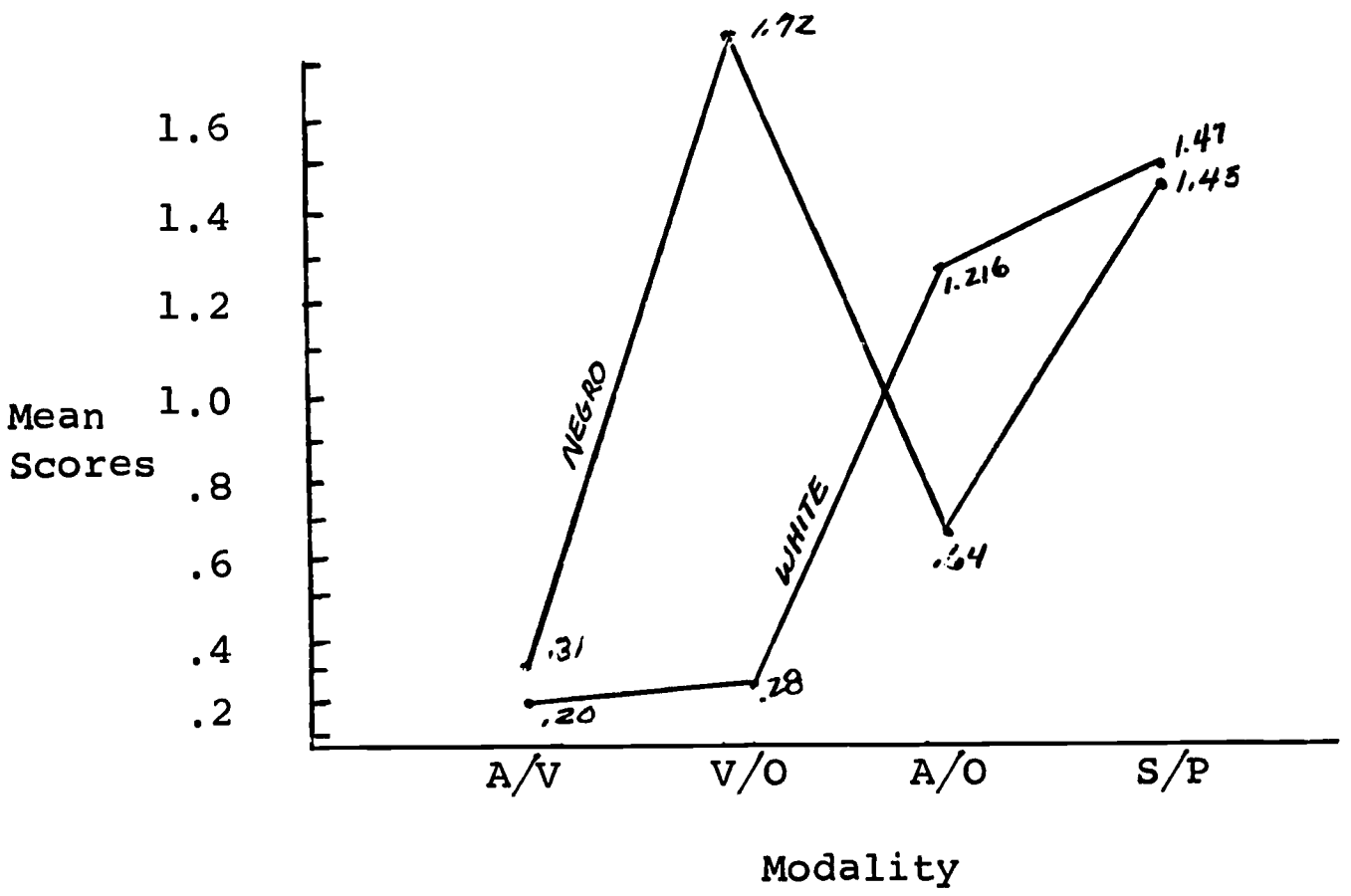
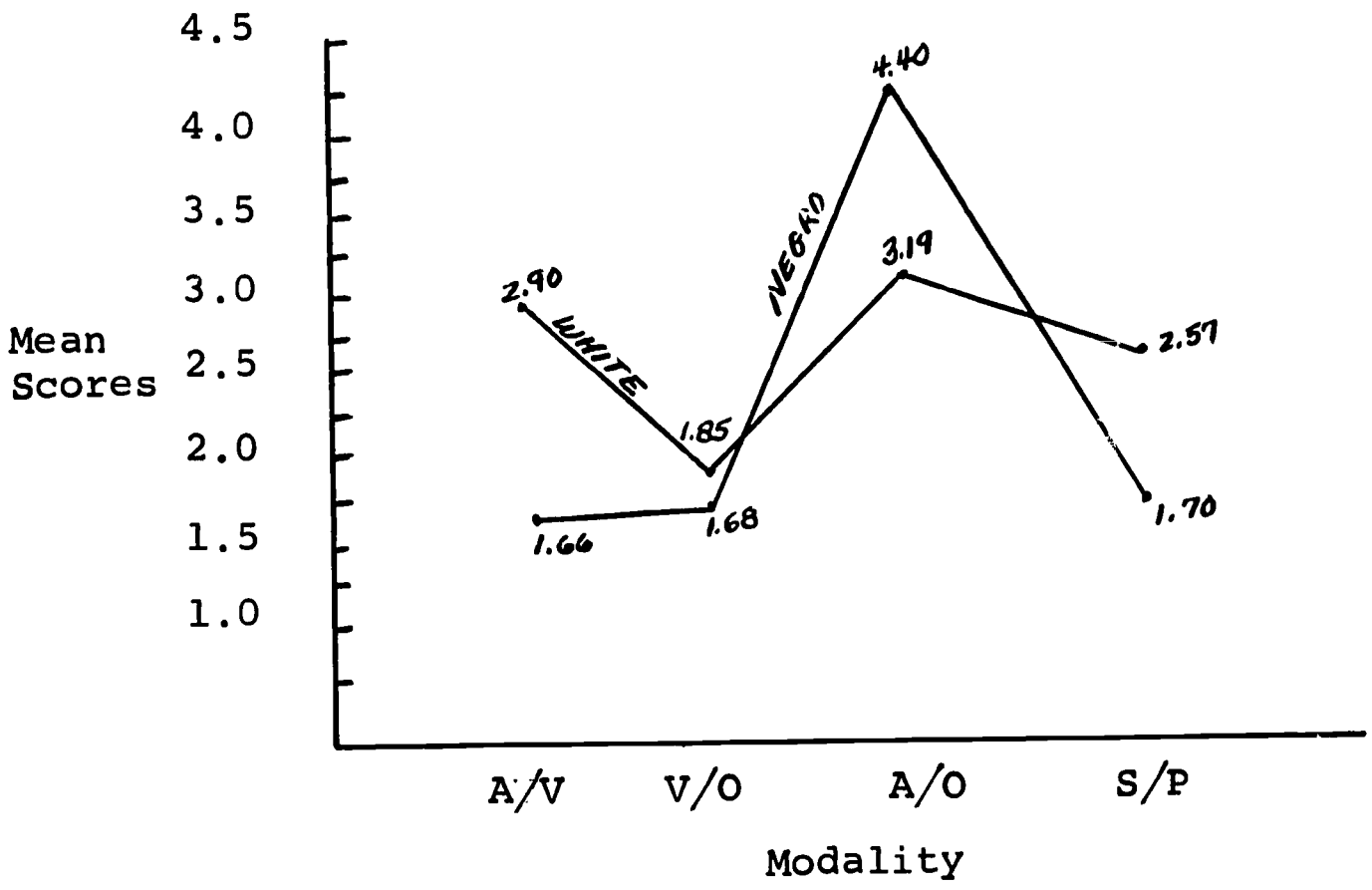


FIGURE 10

Race x Modality for Erroneous POE -- Fear



Sadness. When anger, surprise, fear, disgust or pain was the emotion portrayed, it was called sadness in still pictures significantly more often when compared to the audio/visual modality (main effect for modality -- $F=18.616$, $df=3/167$, $p<.001$).

Similar to the results of analysis for correct scores for individual emotions, mode of presentation of stimuli was highly significant in erroneous perception for each of the seven emotions. However, in the case of erroneous perception, the trend of modalities is reversed compared to findings for correct perception scores. Erroneous perception results indicate that, with some exceptions, still pictures generate the highest error scores,

followed by audio/only, visual/only and audio/visual respectively.

Also, as in the case of correct scores, sex of perceiver was a less potent variable than mode of presentation of stimuli in the analysis of erroneous scores. Sex of perceiver led to significant differences in the case of four of the seven emotions. In all four, male perceivers had higher frequences of erroneous judgments than females.

Again, as with the case of correct perception, race of expressor trailed the other two variables in potency in the analysis of erroneous scores. A significant difference emerged only in the case of Negro expressors being erroneously perceived as portraying anger. Statistical significances for sex, race and modality for erroneous perception of the seven individual emotions are summarized in Table 2.

TABLE 2

Significant Differences in Erroneous POE Variable

Emotion	A*	B	C	AB	AC	BC	ABC
Anger	.01	.05	.001				
Happiness	.05		.001			.05	
Surprise	.01		.001				
Fear	.05		.001			.001	.01
Disgust			.01				
Pain			.001				
Sadness			.001				

A* - Sex of Perceiver
B - Race of Expressor
C - Mode of Presentation

Expressors

Expressors differed significantly from each other in their ability to communicate emotions ($F=41.372$, $df=3/167$, $p<.001$). When the data for all of the expressors in the two racial groups were analyzed, there were no differences between the two groups of actresses in terms of the total accuracy with which they were perceived. When the expressors were viewed individually, some Negro actresses were better in communicating emotions than other Negro and white actresses. This observation was also true of the white expressors when they were viewed individually. There was a significant higher order interaction between race, sex, modality and expressors ($F=18.096$, $df=12/668$, $p<.001$).

Perception of Emotion Model

Table 3 shows the total frequencies of perception for each of the seven emotions. There was a total of 915 judgments for each emotion (183 subjects judging five portrayals of each emotion). Of these, happiness, anger, surprise, and fear were judged correctly more often than pain, sadness and disgust. The greatest confusion was between anger and disgust.

When happiness was the emotion portrayed, it was most often erroneously perceived as surprise. However, surprise was most frequently confused with fear. There was no one outstanding emotion with which fear was confused. Erroneous perceptions of this emotion were about equally distributed among pain, sadness, surprise and

anger. The emotion of pain was most frequently confused with both fear and sadness, while sadness was most often erroneously called fear.

The frequency for correct judgments was also broken down according to race of expressor and mode of presentation. Table 4A shows the distribution for Negro and white expressors. Breakdown by race of expressor showed the same pattern of accurate and erroneous perception as the total judgments, with one exception. When the expressor was white, the portrayal of fear was most often confused with surprise. However, when the expressor was Negro, her portrayal of fear was most often confused with pain and sadness.

TABLE 3

Distribution of Total Judgments

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	656	22	43	23	138	14	19*
Happiness	7	744	104	20	16	12	12
Surprise	56	34	642	114	30	4	35
Fear	55	8	70	640	17	67	58
Disgust	197	54	56	36	472	39	61
Pain	27	13	11	143	29	573	119
Sadness	28	33	53	125	79	64	533

*Maximum number of correct judgments = 915 (183 subjects x 5 judgments)

TABLE 4A

Distribution of Judgment for
White Expressors

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	292	11	23	20	75	6	18*
Happiness	4	382	31	4	14	7	3
Surprise	23	27	322	52	11	2	8
Fear	21	5	59	331	3	17	9
Disgust	97	10	14	22	229	30	43
Pain	10	8	9	72	19	256	71
Sadness	7	10	35	62	43	37	251

*Maximum number of correct judgments = 445 (89 subjects x 5 judgments)

Table 5A shows the distribution of frequencies according to modality. When anger was the portrayed emotion, it was most often confused with disgust on all four modalities, and when disgust was portrayed,it was most often confused with anger on three of the four modalities (Tables 5A, 5B, and 5C). The exception was still pictures in which anger was most often erroneously perceived as sadness (Table 5D). Following the total and racial distributions, on all four modes of presentation

TABLE 4B

Distribution of Judgment for
Negro Expressors

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	364	11	20	3	63	8	1**
Happiness	3	362	73	16	2	5	9
Surprise	33	7	320	62	19	2	27
Fear	34	3	11	309	14	50	49
Disgust	100	44	42	14	243	9	18
Pain	17	5	2	71	10	317	48
Sadness	21	23	18	63	36	27	282

**Maximum number of correct judgments = 470 (94 subjects x 5 judgments)

happiness was confused most often with surprise. When surprise was portrayed, it was confused with fear in the audio/visual, audio/only and still modalities (Tables 5A, 5C, and 5D) and was erroneously called anger most often in the visual/only (Table 5B).

Fear was erroneously perceived as pain in audio/visual and audio/only (Table 5A and 5C); and it was most often confused with surprise in the still pictures (Table 5D); and, it was confused equally with anger and sadness in the visual/only modality (Table 5B). When pain was portrayed, it was most often erroneously perceived as fear in the audio/only and audio/visual modalities (Table 5A and 5C), and sadness in the visual/only and still modalities (Tables 5B and 5D). The emotion of sadness was most often confused with fear in all but still pictures in which it was confused with disgust and surprise.

TABLE 5A

Distribution of Judgments -- Audio/Visual Modality

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	164	0	5	0	31	0	0*
Happiness	0	190	8	2	0	0	0
Surprise	3	4	169	17	6	1	0
Fear	3	0	6	172	1	10	8
Disgust	40	5	8	7	131	9	0
Pain	2	0	1	34	2	143	18
Sadness	0	2	6	35	5	17	135

*Maximum number of correct judgments = 200 (40 subjects x 5 judgments)

TABLE 5B

Distribution of Judgments -- Visual/Only Modality

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	174	0	9	2	31	0	4*
Happiness	0	190	30	0	0	0	0
Surprise	28	4	151	21	11	0	5
Fear	14	0	9	177	2	4	14
Disgust	55	15	7	2	120	8	13
Pain	2	5	2	18	7	152	34
Sadness	4	10	8	35	22	12	129

TABLE 5C

Distribution of Judgments -- Audio/Only Modality

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	159	9	14	6	47	0	0**
Happiness	7	141	35	16	13	12	11
Surprise	6	17	179	23	1	1	8
Fear	11	7	25	147	4	31	10
Disgust	68	3	20	17	122	1	4
Pain	7	2	5	86	5	83	47
Sadness	7	4	6	32	19	18	149

TABLE 5D

Distribution of Judgments -- Still/Pictures Modality

Emotion Portrayed	Emotion judged						
	Anger	Happiness	Surprise	Fear	Disgust	Pain	Sadness
Anger	159	13	15	15	29	14	15***
Happiness	0	223	31	2	3	0	1
Surprise	19	9	143	53	12	2	22
Fear	27	1	30	144	10	22	26
Disgust	34	31	21	10	99	21	44
Pain	16	6	3	5	15	195	20
Sadness	17	17	33	23	33	17	120

* Maximum number of correct judgments=220 (44 subjects x 5 judgments)

** Maximum number of correct judgments=235 (47 subjects x 5 judgments)

*** Maximum number of correct judgments=260 (52 subjects x 5 judgments)

DISCUSSION

Certain patterns, which implicate the three independent variables concerning the emotions, emerge from the results of this study. One of the clearest patterns revealed demonstrates the potent effect of modality on the presentation of emotions.

Meltzer and Thompson (1964) inferred the inadequacy of still photographs as stimuli. Not only has this proposition been substantiated, but the audio/visual and visual/only modalities have proven to be significantly better than the audio/only mode as well. The modality pattern is true for every emotion.

Both audio/visual and visual/only modes were significantly better than still pictures in the perception of three emotions (anger, surprise, and fear). When happiness and pain were presented in the audio/visual and visual/only modalities, greater significance was obtained than with the use of audio/only. In the perception of disgust and sadness, however, only the audio/visual mode was greater in significance than still photographs.

This pattern of modal significance was also observed in the instance of erroneously perceived emotions. For every emotion there were significantly greater erroneous perceptions in the audio/only and still picture modalities when compared to the audio/visual presentations.

These findings support unequivocally, the proposition that the correct perception of emotion bears a strong dependence on modality. The accurate perception of any particular emotion

is contingent upon its mode of presentation.

The patterning of results of the POE data concerning race of expressor is also relevant to perception of emotion, though in a more limited dimension than that of modality. In the perception of four of the seven emotions, racial differences were significant. Negro expressors were perceived with significantly greater accuracy by white perceivers, whereas white expressors enacting happiness and fear were judged with the same degree of accuracy by the same subjects. This phenomenon might be explained in terms of the way white American society as a whole views its black sub-culture.

Recent racial turmoil has probably predisposed the white community to a mass consciousness of a Negro militancy, in which anger, or hostility is the predominant characteristic emotion. This kind of speculation is validated in the results of this study by the patterning of certain correctly and erroneously perceived emotions.

At a significant level, anger was perceived erroneously during the Negro expressors' portrayals of other emotions. On the other hand, to further augment the present conjecture, the Negro expressors' enactment of sadness was perceived with significantly greater accuracy. This latter phenomenon, which may be viewed as an extension of white America's predisposed interpretation of Negro motives and feelings, is probably revelatory of

a greater consciousness of the humiliating history of black subservience in the United States.

Current events, perhaps related to incipient feelings of guilt and mistrust on the part of a largely white society , have probably underlined an awareness of the emotional status of black America. Such an increased awareness culminates, in terms of this study, in an increased sensitivity of a Negro's feelings of sadness and anger by whites.

Contrary to the findings of previous studies (F. H. Allport, 1924; Guilford, 1929; Jarden and Fernberger, 1927; Coleman, 1949; Gitter and Black, 1967) the pattern of results concerned with sex of perceiver reveals that women are significantly superior to men in overall ability to recognize emotional expressions. Perhaps lack of differences between the sexes in POE in earlier studies was due to an artifact; i.e., the use of still pictures as stimuli. Considering the emotions individually, women were significantly more accurate in perceiving happiness, fear, disgust and sadness.

Drag and Shaw (1967) assumed that accuracy of expression of emotion is a function of practice and that expressions of happiness, love, fear, and anger are more characteristic of the woman's role in society. If this is true of perception, as well as expression of emotion, the present findings support their results. This is assuming that practice breeds familiarity; whether active, as

expression of emotion; or passive, as in emotional perception. Assuming practice breeds familiarity, two alternative explanations present themselves. One, the ability to perceive emotion is not a function of practice, or two, and more likely, the woman's role encompasses a broader emotional spectrum than Drag and Shaw (1967) had anticipated. One could speculate that the woman's role, which historically has been subservient to the male's, would be just as well attuned to the negative emotions of disgust and sadness as to the positive ones of love and happiness.

Perception of Emotion Model

The circular emotional expression scale developed by Schlosberg (1952, 1954) from Woodworth's (1938) earlier work, recently has been criticized by the Meltzer and Thompson (1964) and Drag and Shaw (1967). In addition to finding evidence for a 5-step rather than a 6-step scale of emotional expression (disgust and contempt falling into the same category), both of these recent studies found no results indicating circularity of the scale.

Although the present study cannot comment on the number of steps in the scale, since contempt was not one of the emotions expressed, results did support the criticism concerning the contention that the scale is circular. There was little confusion

in the present data between happiness and disgust in the number of total correct judgments, and when correct judgments were broken down according to race of expressor. However, mode of presentation may account for the discrepancies between the various studies. When correct judgments are broken down according to modality, the only confusion which results between happiness and disgust occurs in still photographs, the mode of presentation utilized by Schlosberg and many of the other researchers. Although in this study the confusion between happiness and disgust is limited, it is more obvious in still pictures than when the other three modalities were utilized. The use of still pictures as the sole stimuli in the development of the scales may well have been the reason for the apparent emergence of circularity. However, circularity appears to be peculiar to still pictures and should not be assumed in the utilization of any other mode of presentation.

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APPENDIX A

Instruction Sheet

This study is being conducted by the Communication Research Division of Boston University

You have been given a folder. In it you will find your answer sheet. Please fill out the information asked for. You will (be shown) (hear) a number of people in various emotional states. You are to identify the particular emotion in each case from among the list of seven emotions which appears on the inside left page of the folder. Although you may be at times quite uncertain, you must choose one emotion from among the seven on the list in each case. An answer sheet with even only one unanswered case is unusable in this study. After you (are shown) (hear) each person you will have 20 seconds for answering. I will let you know when one half of your answer time is up. Please remember that you must make a choice in each case. Please do not mull over any one case, for we are interested only in your first impression. Since the people that you will (see) (hear) are part of a larger group of cases, from which they have been randomly chosen, do not expect a logical pattern or any particular sequence for any person or emotion.

APPENDIX B

Name _____ Address _____

_____ Phone _____ Age _____ Sex _____ RE _____

_____1. _____	_____25. _____
_____2. _____	_____26. _____
_____3. _____	_____27. _____
_____4. _____	_____28. _____
_____5. _____	_____29. _____
_____6. _____	_____30. _____
_____7. _____	_____31. _____
_____8. _____	_____32. _____
_____9. _____	_____33. _____
_____10. _____	_____34. _____
_____11. _____	_____35. _____
_____12. _____	_____36. _____
_____13. _____	_____37. _____
_____14. _____	_____38. _____
_____15. _____	_____39. _____
_____16. _____	_____40. _____
_____17. _____	_____41. _____
_____18. _____	_____42. _____
_____19. _____	_____43. _____
_____20. _____	_____44. _____
_____21. _____	_____45. _____
_____22. _____	_____46. _____
_____23. _____	_____47. _____
_____24. _____	_____48. _____

APPENDIX C

Summary Anova Tables[1]

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[1] Within APPENDIX C the following symbols will be used:

A = S of P

B = R of E

C = Mode of Presentation

Table A

Total Correctly Perceived

Source	df	MS	F
A	1	116.911	13.918
B	1	17.784	2.117
C	3	513.153	61.088
AB	1	0.002	0.000
AC	3	4.131	0.492
BC	3	16.827	2.003
ABC	3	28.137	3.350
Error	167	8.400	

Table B

Anger Correctly Perceived

Source	df	MS	F
A	1	1.736	2.071
B	1	19.580	23.349
C	3	12.946	15.439
AB	1	0.235	0.280
AC	3	1.333	1.590
BC	3	2.826	3.370
ABC	3	1.071	1.278
Error	167	0.839	

Table C

Happiness Correctly Perceived

Source	df	MS	F
A	1	2.776	4.305
B	1	7.250	11.246
C	3	24.098	37.377
AB	1	2.991	4.639
AC	3	0.318	0.494
BC	3	2.848	4.418
ABC	3	1.512	2.345
Error	167	0.645	

Table D

Surprise Correctly Perceived

Source	df	MS	F
A	1	1.664	2.429
B	1	2.254	3.291
C	3	17.660	25.782
AB	1	0.402	0.586
AC	3	3.059	4.466
BC	3	1.129	1.648
ABC	3	0.606	0.885
Error	167	0.685	

Table E

Fear Correctly Perceived

Source	df	MS	F
A	1	4.570	5.250
B	1	4.732	5.437
C	3	23.239	26.699
AB	1	2.514	2.889
AC	3	0.068	0.078
BC	3	2.265	2.602
ABC	3	0.826	0.949
Error	167	0.870	

Table F

Disgust Correctly Perceived

Source	df	MS	F
A	1	10.343	11.771
B	1	0.210	0.239
C	3	15.656	17.818
AB	1	0.347	0.395
AC	3	0.893	1.016
BC	3	2.042	2.324
ABC	3	0.404	0.459
Error	167	0.879	

Table G

Pain Correctly Perceived

Source	df	MS	F
A	1	2.608	2.308
B	1	14.513	12.847
C	3	37.198	32.929
AB	1	0.068	0.060
AC	3	0.302	0.267
BC	3	4.333	3.836
ABC	3	3.441	3.046
Error	167	1.130	

Table H

Sadness Correctly Perceived

Source	df	MS	F
A	1	4.623	4.370
B	1	3.586	3.389
C	3	9.464	8.945
A B	1	0.436	0.412
AC	3	1.235	1.167
BC	3	8.650	8.176
ABC	3	1.488	1.406
Error	167	1.058	

Table I

Anger Correctly Perceived

Source	df	MS	F
A	1	12.695	9.685
B	1	4.870	3.715
C	3	14.007	10.686
AB	1	0.338	0.258
AC	3	2.567	1.958
BC	3	0.770	0.587
ABC	3	0.939	0.716
Error	167	1.311	

Table J

Happiness Erronecusly Perceived

Source	df	MS	F
A	1	5.989	5.543
B	1	0.657	0.608
C	3	10.865	10.056
AB	1	0.005	0.005
AC	3	0.259	0.240
BC	3	4.604	4.262
ABC	3	1.068	0.988
Error	167	1.080	

Table K

Surprise Erroneously Perceived

Source	df	MS	F
A	1	11.340	7.811
B	1	2.783	1.917
C	3	25.910	17.846
AB	1	0.454	0.313
AC	3	1.037	0.715
BC	3	1.263	0.870
ABC	3	2.327	1.602
Error	167	1.452	

Table L

Fear Erroneously Perceived

Source	df	MS	F
A	1	8.098	4.329
B	1	3.098	1.655
C	3	35.328	18.884
AB	1	3.309	1.769
AC	3	3.319	1.774
BC	3	12.867	6.878
ABC	3	7.341	3.924
Error	167	1.871	

Table M

Disgust Erroneously Perceived

Source	df	MS	F
A	1	1.062	0.755
B	1	5.360	3.809
C	3	6.892	4.897
AB	1	0.467	0.332
AC	3	3.605	2.561
BC	3	1.078	0.766
ABC	3	1.665	1.183
Error	167	1.407	

Table N

Pain Erroneously Perceived

Source	df	MS	F
A	1	0.035	0.031
B	1	0.350	0.309
C	3	7.277	6.415
AB	1	0.130	0.115
AC	3	0.564	0.497
BC	3	0.910	0.802
ABC	3	0.091	0.080
Error	167	1.134	

Table P

Perception of Expressors

Source	df	MS	F
Between Ss			
A	1	23.382	13.918
B	1	3.557	2.117
C	3	102.631	61.088
AB	1	0.000	0.000
AC	3	0.826	0.492
BC	3	3.365	2.003
ABC	3	5.627	3.350
Error	167	1.680	
Within Ss			
D[1]	4	46.040	41.372
AD	4	0.606	0.545
BD	4	5.794	5.206
CD	12	4.746	4.264
ABD	4	0.129	0.115
ACD	12	0.937	0.842
BCD	12	2.428	2.182
ABCD	12	20.138	18.096
Error	668	1.113	

[1]Repeated Measures--Actors-Expressors

Table O

Sadness Erroneously Perceived

Source	df	MS	F
A	1	0.038	0.024
B	1	0.809	0.513
C	3	29.351	18.616
AB	1	0.995	0.631
AC	3	1.222	0.775
BC	3	3.437	2.180
ABC	3	3.585	2.274
Error	167	1.577	